English Proficiency Level among Science Students

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ABSTRACT

English Language proficiency of the science students of three major ethnics in Malaysia is measured from two perspectives, using the Malaysian University Entrance Test (MUET) as an objective assessment and the self-evaluation questionnaire as a subjective assessment with regard to reading, listening, writing and speech. This subjective assessment is found to be compatible with MUET scores based on the high correlation value. Students with higher scores are more agreeable to the notion that teaching and learning in English can improve the mastery of their English Language.

Key words: Communication, English proficiency, MUET scores, Regression

Introduction

A few studies on teaching and learning of science and mathematics in English have been conducted in past few years in Malaysia (Aziz 2005; Mullis et al. 2008; Ong & Tan 2008; Ishak & Mohamed 2008; Yahaya et al. 2009; Majid et al. 2012; Muda et al. 2012). Studies in decision sciences come in many forms (Hassan & Mohammad Basir 2009; Hassan & Sahrin 2012; Hassan & Ayop 2012; Hassan & Abdul Halim 2012; Hassan & Loon 2012; Hassan et al. 2012b; Varnamkhasti & Hassan 2012), but usually does not involve students. This study is conducted at Universiti Kebangsaan Malaysia (UKM) to examine the university science students’ perceptions of teaching and learning of mathematics and science in English rather than using their native (Malay, Chinese and Tamil) or national languages. It is believed that students’ decisions on their perception and interest play an important role in efforts to uplift the language (Hassan et al. 2012a). Hence, this decision on their perception is to be quantified by requesting students to self-evaluate their level of English proficiency in reading, listening, writing and speech. The frequency of use of English in various situations and environments, the degree of priority given to English in the teaching and learning in science and mathematics, and students’ confidence when communicating in English are also considered as components in this quantification of perception.

Situations and environment on the use of English Language (EL) include the use of EL with family members and searches in the internet which are evaluated on the Likert scale of 1 (very rare) to 10 (very often). Students are to disclose their confidence level when speaking in English and rank the medium (EL, mother tongue or the national language) most suitable to disseminate science and mathematics. The scores obtained from the subjective self-evaluations are compared to the objective Malaysian University Entrance Test (MUET) scores.

Methodology:

The response to the reading, listening, writing and speech items in the form of the Likert scale of 1 (poor) to 5 (very satisfied) for each respondent is formulated as in equation (1) where weight $w_i$ is the ratio of the total score of the i-th component to the total score.

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The same manner is used to formulate the response to the item of using EL in a variety of contexts such as the use of EL when communicating with parents, siblings, friends of the same or different ethnicity, instructors, in commercial or public places and searches on the internet. The frequency of using EL is calculated in the same manner as the Score_EL in equation (1). For the confidence item when speaking English, the original scores used to measure confidence level is replaced by the relative scores. For ranking the language of choice in disseminating science and mathematics, the original scores of 1, 2 or 3 is replaced by the relative scores of the respondents. Only the option of EL as the medium of instruction in disseminating science and mathematics is considered. Finally, the level of English proficiency (LEP) of each respondent was then calculated as the sum of four items as in equation (2) below.

\[
LEP = f(Score\_EL, freq\_EL, confidence\_EL, medium\_instruction) = Score\_EL + freq\_EL + confidence\_EL + medium\_instruction
\]

Results and Discussion

The histogram scores of students' perceptions on English Language as a medium of Teaching and Learning (TnL) is found to be normally distributed. The histogram of the MUET grade (Figure 2) is not as normally distributed as the Level of English Proficiency (LEP) due to the ordinal nature of the observed band grade from grade 1 (lowest grade) to grade 6 (highest grade). An overview of five points for the minimum value, lower quartile, median, upper quartile and the maximum value of the LEP are 3.94, 8.29, 9.86, 11.24 and 16.17 respectively, with mean 9.75 and standard deviation of 2.18.

Fig. 1: Level of English Proficiency (LEP)

Fig. 1: Level of MUET Achievement

\[
Score\_EL = w_1*Reading + w_2*Listening + w_3*Writing + w_4*Speaking
\]

with \( w_i = \frac{\sum_{j=1}^{N} M_{ij}}{\sum_{i=1}^{4} \sum_{j=1}^{N} M_{ij}} \) for \( i=1,2,3,4, j=1,2,...N \)
Figure 3 depicted the box plot showing clearly that the LEP is positively correlated to MUET achievement with $R^2 = 0.546$. A regression relating the MUET results with the LEP median was carried out. This regression equation was found to be $\text{MUET} = -6.08 + 0.94\text{LEP}$ and can be used to predict the MUET scores from the LEP scores obtained. Thus, this equation can be used to predict the MUET grade according to the student score of the LEP.

![Box Plot of LEP against MUET grade](image1)

**Fig. 2**: Box Plot of LEP against MUET grade

There was no significant difference in LEP in terms of undergraduate status. Year 1 and Year 2 students have the LEP mean of 10.10 (0.13) higher than their seniors who are in the final year of their studies with LEP mean of 9.06 (0.18). Most of the seniors are repeating certain courses and their academic performance are quite weak. The LEP scores among gender is almost the same with male students mean is equal to 9.56 (0.19) and female is 9.86 (0.13).

The majority of the respondents (324) have experienced learning science and mathematics using the Malay language while at primary school. The number of respondents who learnt science and mathematics in the Chinese language is 73, in English is 14 and in Tamil is 8. In terms of LEP performance, it was found that students who learnt science and mathematics in Tamil achieve the highest score of 11.37 (0.63), followed by those who learnt science and mathematics in English as a medium of TnL with a score of 10.91 (0.57) and those who learnt science and mathematics in Chinese as a medium of TnL with a score of 10.72 (0.18). The LEP score of the students who learnt science and mathematics in Malay is the least with LEP mean of 9.44 (0.12).

However, the number of the Tamil group is too small to be adduced as evidence. During their secondary schooling years, the majority of the respondents (341) learnt science and mathematics in the Malay Language, followed by English (63), Chinese (13) and only two respondents used Tamil as a medium of TnL. Surprisingly, LEP score was found to be higher for those who learnt science and mathematics in Chinese with LEP mean of 10.83 (12.48) than those who learnt science and mathematics in English with LEP mean of only 10.40 (0.27).

![Box plot of LEP score versus language spoken at home](image2)

**Fig. 4**: Box plot of LEP score versus language spoken at home
A 95% confidence interval for the two groups was overlapping which shows that the difference between the scores is not significant. However, the LEP for those who used the Malay language was 9.59 (0.12) which is significantly lower than the Chinese and English language users. These results were consistent with the achievement of high-level LEP (STPM, matriculation, diploma). The Chinese language users (only numbering 10) had the highest score at 11.34 (0.50), followed by the English language users (320) at 10.00 (0.12) and the Malay language users (87) at 8.61 (0.21).

The effect of being able to read newspapers in English was shown by the LEP scores in Figure 5. Those who read English newspapers have higher LEP scores than those who do not. For example as shown in Figure 5, of those 321 people who read newspapers such as the New Straits Times or the Star have an average LEP score of 9.96 (0.12) which is significantly higher than those who do not with a score of 9.06 (0.23). These results shows that LEP managed to reveal that if a person is proficient in English then he or she can read English newspapers although the instrument used was subjective in nature and the measurement was by self-evaluation.

![Fig. 5: Box plot of reading LEP against reading English newspapers](image)

The correlation between LEP and DOA was found to be 0.572, which is relatively high and significant. DOA is the score that measures the degree of agreement to the statement that TnL in English is able to increase the ability to communicate and apply the concept of Science and Mathematics in English. A high positive correlation of 0.76 is obtained between the scores of LEP and the score of TLSME. TLSME score is a score that measure students' views and agreement on the implementation of TnL Science and Mathematics in English (see Figure 6). This means that the higher the score of a student’s LEP, the higher is his or her agreement with TLSME and this is consistent with the previous findings.

In context of the problem being considered, this correlation is said to be strong. Students who scored high in their TLSME, for example the students of the Faculty of Engineering, would certainly have their English score correspondingly high. This can be verified by looking at their mean LEP score which is highest in the faculty. The self-confidence of the English-speaking students themselves also affects their ability to speak in English. Those who feel confident in their ability to speak in English obtained the mean score 10.52 (0.530) which is significantly higher than those who do not with a mean score of 8.71 (0.14) for LEP.

![Fig. 6: Scatter plot of TLSME score versus LEP score](image)
Conclusion:

A questionnaire was designed as a research instrument to assess LEP. This instrument was able to produce a valid and reliable measure despite being a self-evaluation of students themselves and subjective in nature. This shows that the subjective assessment of students on their English capabilities is valid and can be used. Furthermore, the LEP scores are normally distributed as a consequence of the central limit theorem and thus strengthen the evidence that the LEP resulted from a linear combination of multiple variables.

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References